



8.

ERYSIPELAS OF THE KIDNEY AND URINARY TRACT,

WITH SOME REMARKS ON THE DISEASE GENERALLY CALLED
SURGICAL KIDNEY.

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AN uncommon or new name for a disease requires a word of explanation from him who makes use of it. The cases which I propose to describe under the name of erysipelas of the kidney, &c., are selected instances of that disease which is more commonly known as surgical kidney or suppurative nephritis. I have ventured on the former term for two reasons—firstly, because I believe that some cases of suppurating kidney are really erysipelatosus in their origin; and, secondly, because I want to draw very pointed attention to that fact. This I could not do so well under a more familiar term when the disease is one which everybody thinks is known so thoroughly.

The present day is one somewhat extravagant in its demand for original work. Very little originality can be elicited from these cases; they belong to a group always to be found in hospital wards, and which have been repeatedly described before, though not in the same terms. Notwithstanding this, their treatment is not yet as successful as most surgeons would wish; and I am thus emboldened to ask further attention to the subject. It has long been thought that the catheter and suppurative nephritis were closely allied as cause and effect. We have

lately been taught that the catheter is intimately connected with the appearance of living organisms in the urine, and we have also learned that "contagium is particulate." I do not now express an opinion on these doctrines, but to those who believe in them it will only be an additional link in the chain of evidence, that erysipelas, a specific something, may be communicated by the catheter.

It is to be regretted that every one who reads the cases here detailed did not see them as they occurred. They lose much of their point, when placed on paper, from the very simple fact that the weak parts in the evidence show out, as I think, unduly. They are all, perhaps, quite as well explained on a theory of mere instrumental interference, but if one waited for some direct proof of the connection between erysipelas and urinary inflammations nothing would be said at all, though if such connection does exist, it is very necessary that it should be, even frequently, strongly insisted upon. All those who have familiar remembrance of their hospital life will at once see how extremely difficult, not to say impossible, it is in any case to *prove* contagion from one patient to another, seeing that the sources are quantitatively so many and qualitatively so various. What between nurses, reporters, dressers, registrars, &c., and a miscellaneous multitude of students, some from the dissecting room, others from the dead house, others again from seeing cases at their own homes, besides the chances of exanthem poison being brought by friends who visit the inmates of a hospital, and it would be hard indeed to deny the possibility of other factors in the production of suppurating kidney than erysipelas. To *prove* the position I have taken up becomes, indeed, hopeless. The cases, however, that I have seen have left a strong conviction on my own mind, and it may not, I think, be without interest to record some of them, if haply they may be suggestive to the minds of others. They are as follows:

SERIES I.—William R—, æt. 59, was admitted to Luke Ward on July 2nd, 1873. He had had a bad foot for two years, following upon a severe contusion, and latterly it had become much worse, necessitating its rest in bed. There was great swelling of the whole of the left foot, extending for a short

distance up the leg; a small sore on the dorsal surface of the great toe, and the whole of this surface of the foot covered with a scarlet flush, extending over the ankle-joint; the superficial veins distended and the glands in the groin slightly enlarged. The next day, July 3rd, an incision was made, and a small quantity of pus evacuated. He left the hospital well on the 14th.

The surgical wards at Guy's, as will be known to many of the subscribers to these volumes, are all situated in the old building, and are so placed that two wards, having no through communication with each other, together occupy three sides of a quadrangle. The doors to these wards open upon either end of a corridor, which forms the fourth side. Thus, each is of the shape of a capital letter L, the horizontal or short arm of which abuts upon the corresponding part of an adjoining ward, being separated from it by a wall.

Consequently, each ward has a blind end. Into a bed in this part the aforesaid patient was received. In the next bed towards the end wall had been admitted some time previously a patient, 22 years of age, William R—, suffering from stricture, with a small perineal fistula, which necessitated his wearing a catheter in the bladder. He had up to this time been doing uninterruptedly well, but on July 3rd, the day after the admission of the patient whose case has just been narrated, he vomited, and had headache, furred tongue, and pains in the limbs. His temperature rose to 103.4° , and he spat a little blood. This took place without any local redness or disturbance about the perinæum. His temperature was 99.8° the next day, and he had no further inconvenience.

Two beds away from this patient and under the same dresser a patient had been admitted on June the 19th, with perineal abscess. He had a shivering fit on the 25th of June, with a temperature of 104.2 , and a pulse of 110. This was evidently consequent on pus forming in the perineum, and subsided on its evacuation the same day. A catheter was passed and tied in.

On July 4th (the next day but one to the admission of the case of erysipelas, and nine days after his previous attack) he had again excessive shivering, with pains in his knee- and hip-joints. His tongue was furred. Temperature of 102.1° , with some pallor of countenance. The temperature fell the next day

to $100\cdot8^{\circ}$, and he was better. In addition to his other symptoms the urine, which on his admission only gave a trace of albumen, became purulent, with a good deal of albumen, more so, it was thought, than the mere presence of pus would account for. Two or three days after, he had an erysipelatous blush about his nose. He left the hospital very little improved, and in an extremely anæmic condition.

Both these cases are capable of an interpretation other than that I wish to put upon them. They are brought forward to illustrate the extreme liability of absorption of erysipelas poison by the urinary passages. But it may be said that they are only instances, common enough in surgical wards, of erysipelas attacking any who have at the time of its outbreak any breach of surface. Both these cases had perineal fistulæ. Still, it is curious that in the whole ward of over twenty patients, many of whom had wounds of one sort or another, two cases of stricture only should have fertilised the poison, and that in so remarkably speedy a manner.

SERIES II.—On June 12th, 1873, a patient, Isaac L—, æt. 44, was admitted into Lazarus with stricture of the urethra. He stated that he had had difficulty in passing his urine for six years, and that he had at present received no treatment. He was healthy looking, and only complained of the local trouble. An attempt at catheterism was made, but failed, and he was then ordered alkaline treatment, with belladonna and hot baths.

On the 14th it is noted that an attempt at catheterism was made, and again failed. He passed his urine in a small stream, but better than he had done since admission. His appetite was good, and he slept well. The urine was clear.

16th.—The urine is still normal.

18th.—He now has puffiness of the right eye. He has slept badly, and has great scalding on micturition. He has a pulse of 112; a temp. of $103\cdot1^{\circ}$. The urine passed in twenty-four hours, 36 oz., acid, sp. gr. 1018; urea about 433 grains, or 12 grains per oz.

19th.—Temp. $103\cdot5^{\circ}$; pulse 112. He has an eruption in both groins. Urine 40 oz., neutral, sp. gr. 1018; urea 482 grains. Ordered wine $\text{ʒ}jv$.

20th.—Temp. $102\cdot1^{\circ}$; pulse 100. Rash fading. Pain all

over his body. The urine contains much thick tenacious mucus, 40 oz., alkaline and ammoniacal, sp. gr. 1020.

21st.—Temp. 103.8° ; pulse 112. Brown dry tongue. The urine contains pus to-day. Quantity passed in twenty-four hours 46. oz, sp. gr. 1024; it is alkaline and ammoniacal, containing two thirds of ropy mucus and pus.

22nd.—Urine passed, 63 oz. in twenty-four hours.

23rd.—Urine passed, 62 oz. Temp. 102° ; pulse 132. The urine contains less mucus in it.

24th.—To-day he has double pleurisy; tongue dry; pulse 120; temp. fallen to 101° ; resp. 40; urine 60 oz.

Much muscular tremor; he died at 12.30 midnight. The urine for the twelve hours before death measured 30 oz., sp. gr. 1020, one fourth pus, alkaline and ammoniacal, containing 328 grains of urea.

The inspection made by Dr. Fagge showed double pleurisy, scattered pyæmic patches in both lungs, and pericarditis dependent upon an abscess beneath the pericardium, in the wall of the ventricle.

The kidneys contained numerous scattered points of suppuration in each cortex, and in one was a large irregular mass. The pelvis was pale, and quite free from inflammatory action, the pyramids quite normal in appearance. The only exception to this was in the case of that belonging to the largest patch of inflammation in the cortex. This was inflamed and discoloured. The bladder was inflamed, thickened, and contained purulent mucus. There were numerous scattered points of suppuration in the corpus spongiosum, prostate, and left vesicula seminalis. The prostatic veins appeared to be unaffected.

On the day that the foregoing patient was admitted, and under the same dresser, though in a different ward, a child, aged 2, was admitted with diffuse cellular inflammation of the right thigh, apparently dependent upon acute osteitis. A large abscess had formed, and she was extremely ill. She died on the 19th of pyæmia, having the distribution peculiar to these bone cases of secondary abscesses in the heart and kidneys. It seems possible that this case had something to do with the adverse termination of the other.

SERIES III.—Two cases of stricture were admitted into Lazarus

Ward, one on January 24th, the other on January 27th, of the present year. They were both taken into the back ward, the one being in No. 11 bed, the other in No. 15. They were both under the care of the same dresser. They were both old cases, the one being twenty-five years in its history, the other two. They had both been subject to catheterism before admission, the oldest one repeatedly, though not immediately before. On admission the one could only pass his urine in drops, the urine being thick, and no catheter could be passed. The other passed urine after a bath, which had some mucus in it, but was not offensive. Both cases were kept in bed, and occasional attempts at catheterism tried, and till February 11th they may be said to have been waiting out their period of rest prior to the dilatation of the stricture. On February 11th the one had rigors, nausea, pain in perinæum, and ill-defined thickening, with a temperature of $104\cdot7^{\circ}$, pulse 96, and dry tongue. The other on the same day had also headache, anorexia, purging, and pain about the bladder and urethra; the temperature is not stated on this day, but on the next, February 12th, it was 102° , and the next $104\cdot4^{\circ}$. Both cases terminated in due course in a perineal fistula.

On looking about for possible cause of infection in these two instances, it cannot be said that the search was altogether satisfactory. A patient had been admitted into another ward on January 22nd with a large mammary abscess, occurring during lactation after confinement. She had had many children previously, and was a very unhealthy looking woman, with an average pulse of 120 and a temp. of $100\cdot4^{\circ}$. Eighteen ounces of pus were evacuated by an incision, and again, on the 24th, a fresh incision was made, and a little more pus withdrawn.

She went on well, improving slowly, but on February 13th, two days *after* the appearance of pyrexial symptoms in the two men, it is noted that for the last two days there has been an increase of discharge. The temperature has also increased, and is now $100\cdot4^{\circ}$.

I am not inclined to lay any stress upon this case as it stands as a cause of the other two; indeed, inasmuch as the crisis of the attack was not apparently reached till after that of the others, it would rather appear to have followed than to have preceded the fever occurrent to the case of stricture. I have, however, inserted

it, because, whether a cause itself or not, occurring at the same time as did the other cases, and under the manipulative care of the same dresser, it lends additional support to the infection hypothesis. It matters not if all these were produced by some common and now untraceable source. If they had one in common, they are of interest, because they may be prevented by attacking the one primary source of mischief.

But it is quite possible that this woman may have been really the infecting source: we know nothing of the infective nature of the pus from one patient upon the secretions, mucous surfaces, or blood of another; we know, I venture to think, nothing of the various decompositions which pus undergoes before it is discharged from any given surface such as this abscess cavity in the breast. It is even possible, I suppose, for erysipelas poison to be *cultivated* in such a bed as this without influencing, to any great extent, the soil in which it is nurtured, while for other people it may be a poison of the greatest activity. However this may be, these three cases stand together nearly related in the time of their occurrence, and I could find no other source of infection.

SERIES IV.—These cases are all more or less linked together, while, again, the origin of the mischief is somewhat difficult to discover.

Between May 11th and June 14th three patients died from stricture and suppurating kidney, all in the same ward and all under the care of the same dresser; while two other cases of bladder trouble in the same ward about the same time—one under the same dresser, the other under the care of another gentleman—had each an anomalous attack, which looked like blood-poisoning rather than anything else. It may be said of them, however, that at no time were their lives in danger. The facts are shortly these:

George S—, æt. 48, was admitted on March 14th. He had never had gonorrhœa, but had several times had swelling of the testicle. Four years ago he first had retention of urine. He had not noticed anything wrong before. His urine was first seen to be thick three weeks ago, and remained so for a fortnight. He had a catheter passed at this time.

When admitted he could pass a small stream of urine, and he was in good general health. It does not appear from the report that the urine became thick till some time subsequently.

Repeated attempts were made at catheterism, but unsuccessfully, and on the 27th of March he had rigors. These were repeated on the 29th and 30th, but were not followed by anything more serious than an inflamed testicle.

On April 12th he had severe headache; his temperature was 102.4° , pulse 98, and his urine thick. He subsequently got extravasation of urine; incisions were made into the scrotum and perinæum, and he finally died of pyæmia on May 12th.

At the post-mortem pyæmic abscesses occupied the lungs; the kidneys were very large, weighing thirty-two ounces, and were full of small cysts. The bladder was much hypertrophied, and the walls half an inch thick; the urethra was very tightly strictured and dilated behind the constriction. He had one false passage, but no sloughing existed.

Now, where this man got his pyæmia I do not know; but this is clear, that whereas he was in good health on his admission to the hospital, the passage of catheters sufficed to excite a high degree of fever long before any extravasation took place or before any wound was made that could account for the blood-poisoning, and this, probably, without any suppuration of the kidney. It seems clear, to my mind, that the mere passage of catheters was enough to set up this, and put him in a fair way for getting pyæmia.

At the same time a patient, Richard C—, occupied a bed nearly opposite to him with calculus in the bladder. On May 11th (the day before the former patient died) he began to complain of rheumatic pains in the right side and front of the chest, and on the 13th he had a distinct tender swelling over the second rib; he also stated that his urine had been thicker since the passage of a lithotrite on the 7th.

On the 17th he became quite unable to move his right arm; the swelling subsided, but an erythematous redness diffused itself over the right side of the chest. His urine became rather clearer, but he got some slight swelling and pain in front of the anterior fold of the right axilla. His temperature oscillated between 98° and 99° , and was now 100° . A circular patch

now appeared on the left shin, the size of a half-crown piece, reddened by a general flush and ecchymotic points. It was very tender, accompanied with a little subcutaneous thickening.

He left the hospital on May 28th. The patch of erythema on the shin was spreading, and the swelling over the rib now fluctuating. Temp. 100° .

On May 16th a patient, æt. 51, was admitted to a bed, one other only intervening between him and the last-named patient. He gave a history of urinary trouble for seven years, and occasionally during that time he had passed a catheter himself, his stream being generally of good size. Attempts at catheterism had been made for him as an out-patient, but without success.

When admitted he had some scalding on micturition; his urine contained pus and phosphates, and no catheter could be passed.

The next two days he had rigors. Temp. 102° ; pulse 120; resp. 36; urine thick and ropy; no perineal thickening; profuse sweating followed. He was ordered Mist. Quinæ $\mathfrak{z}\text{ij}$ t. d., and his temperature fell next day to 96.8° . He seemed altogether better.

On May 22nd he again had sweating; his temperature was 101° ; urine ammoniacal and thick. He now had perineal tenderness and swelling, then extensive extravasation, to relieve which perineal section was resorted to, and he died of pyæmia on June 13th. Up to the day before his death his temperature was between 102.5° and 103° .

The post-mortem, made by Dr. Fagge, showed several small pyæmic abscesses in the lungs. The kidneys weighed ten ounces; both of them presented numerous points of suppuration, and one seemed to have hardly any part of its cortex left uninflamed. The pelvis was but little altered, presenting only a slight increase of vascularity and some points of ecchymosis.

The bladder was inflamed and contracted. The prostate had many points of suppuration in it, and in its left side an abscess of considerable size, which ran backwards below the bladder; there were many points of suppuration also in the connective tissue about the prostate, and pus was seen to come from the

mouths of divided veins. The connective tissue of the perinæum was in a sloughy state.

On May 15th a patient, Henry H—, æt. 55, was admitted into Lazarus, bed No. 16. He had been treated for stricture ten years ago in the hospital, and had left, as he said, cured. He had not found any necessity to pass catheters since. In the last eighteen months he has had several attacks of partial retention, the urine being very thick, and only coming in drops. A fortnight previously he had had one of these attacks, and unsuccessful attempts at catheterism had been made. The want of success appears chiefly to have depended upon a perineal abscess which was forming at that time, and which was opened twelve days before his admission, but which has since closed. When admitted he had some thickening in the perinæum, but no wound. He passed urine in a small stream; it was thick and contained pus. A fresh perineal abscess formed soon after admission, but within four days of his entry flexible catheters Nos. 6 and 7 could be passed, and the stricture caused no further trouble. He had also a large prostate, and once had retention, probably owing to this. He had, however, much cystitis, as was evident from the state of his urine, and to relieve this his bladder was washed out daily with a weak solution of carbolic acid. He was thought to be doing well, his temperature varying between 98° and 99°, and his pulse being about 80.

On June 11th, two days, it will be noticed, previous to the death of the prementioned patient from pyæmia, his pulse went up to 108, and his temp. to 104·8°. He got a dry tongue, rheumatic pains, and died on the 13th.

At the post-mortem examination the kidneys weighed eleven ounces. Some spots of recent suppuration were found in the cortical structure, and one abscess much larger than the rest, the adjacent cortex being indurated, as if it had been the seat of a past inflammation. The pelves were greatly dilated. Bladder thickened, of moderate size, its lining membrane much inflamed.

Such a case as this seems to me an important one. Here was a patient admitted with a severe form of cystitis. There was evidence that on and off for the last eighteen months he had been in a similar state; it is even highly probable, seeing what a great deviation from the normal standard of health, the

class of patients frequenting hospitals are in the habit of calling "nothing," that more or less cystitis had existed all the time. He was submitted during his stay to most careful treatment, and I can state from personal knowledge that his bladder was washed out daily by a most attentive and able dresser, and he improves under the treatment, and then, when pyæmia is in the ward, he suddenly dies with high fever and general blood-poisoning.

Now, how he was to fall into a pyæmic state, except by means of his genito-urinary mucous tract, it is not easy to see. It is also not easy to see why, with a suppurative disease of bladder going on for some time previously, he should have changed for the worse at this particular time, unless it was owing to some special external conditions which acted upon the bladder or urine, by means of the daily catheter.

Another patient at this particular time, though doing, on the whole, uninterruptedly well, on May 29th had rigors, sweating, and a temp. of 100.4° , with headache, giddiness, and loss of appetite. The attack in his case only lasted a day or two, and hardly could be said to retard the progress of the case; but it seems, slight as it is, to be most significant, occurring at this particular time.

SERIES V.—John W—, æt. 45, a seaman, a remarkably healthy looking though fat man, was admitted during the course of the present year for stricture of the urethra and retention. No catheter could be passed, and puncture per rectum was had recourse to. He did very well until three days after, when he had rigors. However, on the fourth day he was still pretty well, sitting up in bed, reading a newspaper, and the canula was taken away from the bowel. He now got pains about his sterno-clavicular region and left forearm, fell into a typhoid state, and died four days after. He became very yellow before death, and had evidently got a severe form of pyæmia.

At the post-mortem, abscesses were found on the left side of the chest, in the cellular tissue just below the clavicle and sterno-clavicular articulation, in the muscular tissue over the lower ribs on the right side, and in the intermuscular septa deep among the muscles of the forearm. In addition, the muscular wall of

the heart had three almost diffuent patches, which could not correctly be called abscesses, seeing that the pus they contained was in very small amount; they were, in truth, sloughing muscle, and when examined by the microscope, fifty hours after death, they were swarming with bacteria;—indeed, but little else could be seen. But few pus-cells existed. The healthy muscle elsewhere in the heart away from the diseased patches was examined carefully at the same time; it also was not free from bacteria, but while in the healthy parts they had to be counted by units with long distances between, in the sloughing parts they were aggregated in masses uncountable.

The lungs had some hypostatic pneumonia at their bases. The bladder and kidneys were practically healthy, the kidneys quite so, the bladder containing neither alkaline nor offensive pus. The channel made by the canula from the rectum to the bladder looked a little sloughy, but the prostate in its neighbourhood was perfectly healthy, and no pus could be found in any of the veins. The chief mischief seemed to be in front of the stricture, which occupied the usual spot near the end of the corpus spongiosum. In the bulb was found a sloughing cavity, half an inch in diameter, containing a thin dirty brown fluid, and communicating with the urethra by a channel which joined it near the end of the corpus spongiosum. No suppuration could be found in any of the veins about the part.

To complete the history of this case, it must be stated that on the same day on which this man had his first rigors another patient in the same ward had an operation performed on his face, and within two days he got a sharp attack of erysipelas, the temperature rising to $102\cdot4^{\circ}$, then to $105\cdot6^{\circ}$, and he was not well at the end of a fortnight.

Taking these facts together, it seems that the conclusion is well warranted that the ward at this particular time was erysipelalous, and I think there can be no doubt whatever, that the man who had stricture lost his life by the unfortunate though absolutely necessary catheterism at this particular time.

Here we must take leave of this special part of our subject to say a few words on the disease in general; and inasmuch as what I have to say will, in great measure, be based upon material obtained from the post-mortem records of Guy's Hospital

for nineteen years past, I propose first to deal shortly with the statistics of the subject, and subsequently with the questions of diagnosis, prognosis, and treatment.

The main facts elicited from the perusal of the post-mortem records are these :

In nineteen years the number of patients dying from local disease or causes secondary to it, with evidence of old urinary obstruction, amounts to 277—a yearly average this of about 14·6 cases.

They are thus apportioned to the different diseases :

| | Cases. |
|---|-----------|
| Stricture | 100 |
| Enlarged prostate | 27 |
| Calculus vesicæ | 44 |
| Cancer of bladder | 14 |
| „ uterus and bladder | 29 |
| Pressure from external tumours, &c. | 7 |
| Paraplegia from disease or fracture | 56 |
| Total | <hr/> 277 |

I. Among the cases of stricture, 100 deaths occurred in nineteen years, giving a yearly average of about 5·26. This closely accords with the numbers given by Dr. Steele in a former volume of the ‘Guy’s Hospital Reports,’ where for the period 1861 to 1868 the number of annual admissions averaged 105, with an annual average mortality of six.

Of the whole number of cases, the kidneys were suppurating in forty-one of the 100; they were wasted or inflamed in eighteen; in seven they showed evidence of the changes included under the term Bright’s disease, or were cystic; while in the remaining thirty-four they were healthy.

Thus, fifty-nine, or nearly three fifths of all the cases, had advanced disease of the kidney.

In twenty-four of the fifty-nine one kidney was much more affected than the other, and in three of those in which suppuration occurred it was confined to one side, in one case disease being limited to one side, in the other two the non-suppurating organ was wasted.

The state of the bladder is not stated in thirteen cases. It was found healthy in five, and in three of these the kidneys were also healthy; the other two were cases, the one of suppuration, the other of atrophy of the kidney.

The remainder, eighty-two in number, are all noted as having an hypertrophied muscular coat, this condition going with a contracted state of the cavity in twelve, with dilatation in two only. It is, however, I think, probable that the size of the cavity has, in many cases, escaped notice, and only the very marked conditions have been recorded as of any moment.

Of those cases of hypertrophy associated with contracted bladder the kidneys were—

| | |
|-------------------|-------------------------|
| Cystic in 1 case. | Suppurating in 6 cases. |
| Wasted „ 3 cases. | Healthy „ 2 „ |

The suppurating organ on the one side was twice associated with a wasting condition on the other. The two cases of hypertrophy with dilatation both occurred with suppurating kidneys.

Mucous coat.—In 12 sacculation existed, in 9 the membrane was inflamed, in 20 various degrees of more intense cystitis were noted. Only 23 of the number have the condition of the urine stated; fetid and purulent was the description of most of them. It is only directly stated to have been ammoniacal in four.

Ureter.—Dilatation is recorded against 20 cases, thickening in 4 cases, inflammation and suppuration in 12 cases.

Respecting the relation existing between acute and chronic disease of the kidney I am a little doubtful whether it is quite correct to assume that, a stricture having existed for a long time, the kidney will probably show evidence of old disease. The pelvis of the kidney will likely enough be found dilated and the pyramids flattened down, and, perhaps, the capsule thick, but the facts do not allow me to say that, in the majority, the cortical substance is deteriorated. The cases of stricture dying out of the usual course by extravasation of urine or by some other disease show for the most part either an acute disease or a healthy state, and not evidence of chronic mischief oftener than in the proportion of one in five, with the exception of pelvic dilatation, as before said. It is most likely that the wasted cortex found in many old cases is dependent, not on atrophy by mere pressure backwards of the urine, but on inflammation of the renal pelvis, *associated* with cortical atrophy, and this would seem to confirm what is said in another part on the question of atrophy and pressure. The block produced by pyelitis and inflammation amid the straight tubes would be much more complete

than in obstruction further forwards. The available space for storing the secretion would be much less; the tension, therefore, greater, and the greater the probability of the secretion force being neutralized thereby.

It has further been shown by Mr. Bryant ('Medico-Chir. Trans.,' vol. xlv, p. 337), in an analysis of 230 cases of lithotomy, that the longer a stone exists in a patient's bladder the more the probability of the kidneys being diseased. In 17 of 19 deaths kidney disease existed in different degrees of severity, suppuration and degeneration being present in all. In the list of cases I have collected, 39, omitting one case of granular kidney, out of 44 cases, had disease of the kidney; this is a much larger proportion than in stricture cases, where 59 of 100 only are so diseased. This is what one would expect if it be true, as I have said, that mere backward pressure is often not sufficient, without inflammation super-added, to damage the kidneys materially. Stone cases being liable to repeated attacks of cystitis, should show a large proportion of cases of diseased kidney, and that in such cases they are indeed exceedingly liable to inflammatory changes will be seen at once on referring to the cases given by Mr. Bryant and those tabulated here.

Again, it must not too hastily be concluded that chronic changes in the kidney are elements predisposing to a suppurative state. Other things being equal, a diseased part is more liable to become inflamed than a healthy one, and there is no reason that I know why the kidney should prove any exception to the general rule; but I take it that in cases of bygone pelvic inflammation the vessels of the diseased parts have undergone thickening and narrowing and retraction. The cortical atrophy is itself the best evidence of this, and the parts are altogether less vascular. The actual number of cases where, with old disease in the shape of irregular surface, an acute inflammation or suppuration occurred, amounted to no more than ten, or in all the cases of diseased kidney, in the proportion of about 1 in 6. The condition of the heart was noted in 17 cases. In three there was some slight hypertrophy, but in no case was it extreme. Lastly, as to the cause of death. In those patients, not dying directly from suppurating kidneys, extravasation and its consequences take a large share in the fatal result, perineal

section and pyæmia coming next. Another cause is suppuration about the bladder and prostate, while some ten or eleven died of disease altogether unconnected with their stricture, and which need not be enumerated here.

II. The cases of enlarged prostate are 27 in number :

| | Cases. |
|--------------------------------|--------|
| Kidneys, suppurating | 20 |
| „ wasted | 2 |
| „ granular | 2 |
| „ inflamed | 1 |
| „ dilated pelvis | 1 |
| „ healthy | 1 |

There is a considerable difference, then, between them and the cases of stricture. Three fifths only of the stricture cases died with kidney disease ; here 1 in 1·17 dies—23 out of a total of 27. In 7 of the 23 the two organs were attacked to an unequal extent, and in 1 the suppuration was unilateral. In 2 an acute suppurative disease was combined with a chronic wasting one.

The changes in the bladder do not differ materially in character from those found in stricture. The proportion of cases in which it was dilated is larger, but the numbers are not large enough to warrant any definite conclusions.

The *muscular coat* was hypertrophied in 20 cases, hypertrophied and contracted in 1, hypertrophied and dilated in 5.

The *mucous coat* was sacculated in 4, inflamed in 12. In the only case in which the kidney was healthy the bladder was hypertrophied, sacculated, and sloughing.

The *ureters* are not mentioned in 13 cases. For the rest they are dilated in 6, inflamed in 4, thickened in 7.

The urine, in all the cases in which its condition is stated, 12 in number, was either purulent, fetid, or ammoniacal.

The coexistence of acute and chronic disease is only found in 2 cases.

The condition of the heart is mentioned in 8 cases ; 1 weighed sixteen ounces, 1 thirteen ounces, 3 twelve ounces, and three are described as normal.

III. Cancer of bladder, 14 cases :

| | Cases. |
|--------------------------------|--------|
| Kidneys, suppurating | 6 |
| „ wasted | 5 |
| „ dilated pelvis | 2 |
| „ healthy | 1 |

In 6, one side was more affected than the other, suppuration occurring twice in one organ only; wasting also in 2 was confined to one side. In 1 of these the growth distinctly involved that side of the bladder. The existence of acute with chronic disease is not found in this series.

The bladder is said to have been hypertrophied in 4, sloughing in 1, healthy in 1. In the remainder the new growth appears to have monopolised attention, and the existence of suppuration is not stated. The urine was purulent or thick in 3 cases.

The ureters were dilated in 7 cases. The other 7 were not described.

IV. Vesical calculus, 44 cases. This gives a yearly average mortality of 2·31, or, taking the average number of admissions as 30 cases per annum—that given by Dr. Steele in his tables—a mortality of about 7 per cent.

| | Cases. |
|--------------------------------|--------|
| Kidneys, suppurating | 31 |
| „ inflamed or wasted | 8 |
| „ granular | 1 |
| „ healthy | 4 |

Nineteen of the 39 subjects had disease of different intensity on the two sides, and in 8 of these the suppuration was confined to one kidney entirely, being associated in 3 cases with a healthy state on the opposite side, in the others with a wasted organ. It is to be noted, in all these cases, that the wasted side is not the suppurating one. The abscesses are found in a comparatively healthy kidney.

In 5, acute and chronic disease were blended.

Bladder, muscular coat.—Hypertrophy is only described as existing in 8; the cavity was contracted in 13; dilatation is not mentioned once; sacculation was present in only two.

Mucous coat.—Inflammation, in one of its various degrees, was present in 23 cases, going to the extent of suppuration, sloughing, or the formation of lymph and phosphatic matter in

14. In the other 9 it is said to have been inflamed, injected, or ecchymosed. Six only are described as healthy, the kidneys in the corresponding cases suppurating in 4, inflamed in 1, healthy in only 1.

The ureters were dilated in 13, inflamed in 16, having gone the length of suppuration or being lined with fetid lymph in 7 of the 16. In 1 case dilatation and injection were confined to one side, in another the right side was dilated, the left injected.

The condition of the heart is stated in 4 cases, and all may be said to have been healthy, the greatest weight being twelve ounces.

The urine is mentioned in 11 cases, and in all was offensive, ammoniacal, or purulent.

| | | |
|---------------------------|------------------------|-----------|
| Lithotomy | was performed in | 22 cases. |
| Lithotritry | " " | 8 " |
| Perineal section | " " | 2 " |
| Lithotritry and lithotomy | " " | 1 case. |
| None | | 10 cases. |

Of the cases in which a healthy state of the kidney was found, one had suffered lithotomy, one lithotritry; in 2 no operation had been attempted.

Of those in which a healthy bladder obtained—

| | | |
|-------------|------------------------|----------|
| Lithotomy | had been performed in | 2 cases. |
| Lithotritry | " " | 2 " |
| Both | " " | 1 case. |
| None | | 2 cases. |

The points to be noted especially in this group are, I think, first, the large proportion of cases of acute suppuration and inflammation, of the former in the proportion of 1 to 1·42; of all acute disease together 1 to 1·21, this going with a greater extent of surgical interference, 33 cases out of 44 undergoing serious operations about the bladder. In stricture cases the proportion of cases of acute disease is only in the proportion of 1 to 2·38. In large prostate cases it is about the same as for calculus, 1 to 1·28 of all cases.

Secondly, it is important to note the condition of the bladder as to the size of the cavity, which in 13 was contracted, or in nearly half the total number. The bearings of this point will be indicated presently.

V. Cancer of uterus, 29 cases :

| | Cases. |
|--------------------------------|--------|
| Kidneys, suppurating | 6 |
| „ inflamed | 1 |
| „ dilated | 11 |
| „ wasted | 11 |
| | <hr/> |
| | 29 |

Fifteen of these were affected on one side more than on the other. In 10 of them the disease was entirely confined to one kidney.

| | Cases. | |
|-------------------------|--------|---|
| Ureters, dilated in 14. | | On one side only, in two cases. |
| „ inflamed in 3. | | Associated with suppuration of the kidney, twice; with an atrophic state, once. |
| „ thickened in 1. | | |
| „ not stated in 11. | | |

| | Cases. |
|----------------------------------|--------|
| Bladder, inflamed | 4 |
| „ healthy | 14 |
| „ laid open by disease | 10 |
| „ not stated | 1 |
| | <hr/> |
| | 29 |

Of the 10 cases of one-sided disease of the kidney, 5 were directly attributable to a local implication of one ureter,—either by a nodule of cancer at its orifice in the bladder, or as it ran in the neighbourhood of the diseased uterus on its way to the bladder,—and all were cases of shrinking.

Of the 10 cases in which the bladder was laid open by the disease, suppuration of the kidney occurred three times; two of the three, however, were associated with a retained urinary secretion, owing to the position of the outlet; in one of them the urine was ammoniacal. Acute inflammation occurred in one case. In two of the remainder an inflamed bladder was found, the kidneys being unaffected, except by the presence of the new growth.

Three other cases of suppuration complete the total for cancer of uterus, and they are of sufficient interest, from the obscurity of their cause, to justify a short note of each being inserted.

Jane C—, æt. 44, was admitted under Dr. Rees on March 8th,

1865, with cancer of the uterus. She died on May 12th. She was almost dying on admission, her principal symptom being constant sickness. It was thought she must have carcinoma of the stomach. There appears to have been no suspicion of urinary trouble.

At the inspection, one kidney was distended, and its pelvis filled with pus, the mucous membrane and ureter being inflamed. The condition appeared to be due to an implication of the right ureter in disease of the lymphatic glands in the iliac region. She had carcinoma of the cervix uteri.

Elizabeth W—, æt. 65, was admitted in 1866, without any history, and she died suddenly. The kidneys were pale and anæmic. Dr. Moxon reports upon them microscopically, that they contained shrivelled Malpighian tufts, small microcysts, and free fat-grains, in an open-textured stroma. They had interstitial suppurating spots.

The bladder was enormously distended with *clear, pale* urine; its coats not inflamed, its muscle-fibre hypertrophied. The bladder was cancerous at its neck, but its cavity was not laid open.

Sarah M—, age not stated; was admitted November 16th, 1869. No history. She had cancer of the uterus.

The kidneys weighed eleven ounces; were both pale; the left had suppurative pyelitis, and was in a very foul state. Corresponding to this condition, it was found that the bladder within showed much inflammation around the orifice of the left ureter, and none around the right. The injected mucous membrane had on it a coat of lymph. The right kidney was healthy.

In none of these three does it appear that catheterism had anything to do with the suppurative nephritis. It is not likely in any that it was due to a general pyæmic poisoning, since only one kidney was attacked in each case, and we are forced to the conclusion that local conditions were the sufficient cause.

In the second of the cases the facts are very explicit. The bladder was not inflamed, and its contents consisted of clear, pale urine. Could such a fluid have been undergoing putrefactive decomposition, or have been sufficiently altered to excite suppuration in the kidney, without showing some amount of

change in the other parts also? At the same time it is by no means easy, in objecting to the common explanation in such a case, to find a better. I fancy, however, that mere "over-action" is the direction in which it must lie—in that want of balance, which is elsewhere discussed, between secretion and a neutralizing pressure produced by the reflux of urine. The kidney, it may be suggested, is stimulated to greater work by the contiguity of products which, although already excreted by it, are still close enough to the gland-cells to influence their action, perhaps, indeed, by returning to them again by reabsorption to be re-excreted in consequence of the obstruction in front. One of the most extreme forms of suppurating kidney that one could ever see, is to be found in the Hunterian Museum at the Royal College of Surgeons (prep. 1893), and it has this history attached:—"From a man sixty years old, to whom tincture of cantharides had been given for incontinence which followed retention. The medicine produced extreme pain, both in the bladder and kidneys, and retention of urine, which continued two days. When the urine was drawn off it was fetid and mixed with blood and pus. All power over the bladder was lost, and the patient died in three weeks."

The kidney is well described as one in which "pus was extensively diffused through the cortical substance and between it and the capsule. The capsule has been removed, and the surface of the kidney is flocculent and covered with numerous shreds of its softened and broken-down tissue." It is this flocculent state which gives it the appearance of such extreme disease, and there can hardly be a space of a line or two throughout the organ which is not the seat of minute abscesses. This case seems to me an illustration of the explanation given to the case preceding it. The man died, indeed, it is said, with a sloughing bladder and large prostate as well, and it is not stated in so many words that he had had no catheter passed before the cantharides was administered; but allowing these deficiencies to be somewhat detrimental to the case for my purpose, it still remains that the condition of the kidney is an exceedingly bad one, worse than any other I have myself seen, and I cannot but think that the drug given for his relief had much to do with it in the direction of over-stimulation.

Eight additional cases occur where displacement of the

uterus, pelvic tumours, &c., were present, and had caused, in seven cases, changes in the urinary organs, suppuration. in three cases being unilateral; wasting in four, two of them unilateral. In one of vesico-vaginal fistula the kidney is not mentioned; we may therefore presume that it was normal. The bladder was healthy.

The ureters were dilated in two cases, both of pelvic tumour, one a solid uterine growth, the other an ovarian tumour. They were inflamed in another case, one of prolapsus uteri, in association with a suppurating kidney, sloughing bladder, and fetid urine. A second case of prolapsus uteri had wasted kidneys, thick ureters, and hypertrophied bladder with muco-purulent contents.

VI. The last group to be mentioned is that of paraplegia, whether due to fracture and injury of the cord or to the primary disease of the medulla spinalis itself. One case of retention during an attack of cholera is also placed with them. It fitly goes with the others as an instance of paralysis of the bladder.

The total number of cases is 56. This comprises—

| | Cases. |
|------------------------------|----------|
| Suppurating kidney | 26 |
| Inflamed „ | 3 |
| Wasted „ | 1 |
| Healthy „ | 24 |
| Not stated | 2 |
| | <hr/> 56 |

Twenty-nine cases, then, out of 56, or rather more than half died with acute disease of the kidney.

In only five of the 30 cases of disease was one kidney affected more than the other, showing thus a great difference between this group and that of stricture of the urethra, where 24 out of 59 cases showed mischief to excess on one side

The acute disease of the kidney was associated with

| |
|-------------------------------|
| Sloughing bladder in 7 cases. |
| Inflamed „ 16 „ |

Dilatation of its cavity was associated with one or other of these conditions in 3 cases, contraction in 2, hypertrophy in three; and here again may be remarked, as contrasting cases of obstructed outflow with cases of loss of expulsive power,

that the latter are marked by an absence of the hypertrophied state of the bladder noticed in the former.

The 24 cases in which the kidneys were found healthy were associated with—

| | | |
|-----------------------|------------|---|
| Contracted bladder in | 2 cases. | |
| Inflamed | „ | 8 „ |
| Healthy | „ | 4 „ |
| Not stated | . . . 11 „ | One case being included both as inflamed and contracted. |

The ureters were inflamed in 14 cases.

The urine was fetid and purulent in 8 cases, ammoniacal in 1, in the others its condition is not stated.

Catheterism is noted as having been resorted to in 13.

The length of time between admission and death varied exceedingly. The shortest case was three days in the hospital only, the bladder being inflamed, suppurating, and with highly offensive urine at the end of that time. The shortest period at which a suppurating kidney was found was six days.

The patient living longest died at the end of twelve months, and the kidneys were found to be healthy.

So much for the statistics which the post-mortem records have afforded. Looking back now upon the whole number of cases, we have the following results in respect of the kidney :

| Nature of case. | Deaths from all causes. | Kidney, suppurating. | Kidney, wasted or inflamed. | Dilated pelvis, &c. | Kidney, healthy. |
|--|-------------------------|----------------------|-----------------------------|---------------------|------------------|
| Stricture | 100 | 41 | 18 | 3 | 34 |
| Enlarged prostate . . | 27 | 20 | 3 | 7 | 1 |
| Calculus vesicæ . . . | 44 | 31 | 8 | 1 | 4 |
| Cancer of bladder . . | 14 | 6 | 5 | 2 | 1 |
| „ uterus, &c. . . . | 29 | 6 | 12 | 11 | ... |
| Displacement, tumour, &c., of uterus | 7 | 3 | 4 | ... | 1 |
| Paraplegia | 56 | 26 | 4 | ... | 24 |
| | 277 | 133 | 54 | 24 | 65 |

Thus, nearly half the deaths from interference with the free play of the stream of urine, or the channels along which that stream passes, are attended with suppurative nephritis, while they are in the proportion of 1 to 1.48 taking suppuration, the less intense form of inflammation, and wasting together.

Of all the questions connected with the subject, perhaps the cause of the suppuration is still the most interesting, if only from the exceeding practical importance of such a large class of cases. The consideration of this, the main question, involves the recognition of certain minor ones, the bearing of which on the production of the suppuration is still under discussion. The points which chiefly commend themselves to our notice are these: the possibility or not of the disease being lighted up idiopathically; whether the necessity of contamination by atmospheric influence is invariable or not; or, again, the relation in which the surgeon stands to its production. All these questions really admit of the least delay possible in their settlement, for upon their issue depends the preventive treatment of each case. But some will perhaps ask what more can be said on the subject of surgical kidney than is already known? To say that it is a disease especially attendant upon operations about the bladder defines its cause: what else is there to know? A few words on the following points will go far towards answering this question by indicating the direction in which its solution may be found.

1. Is the disease invariably secondary to inflammation of the bladder?

2. In secondary inflammation of the kidney what evidence is there, if any, that cystitis *per se*, uncomplicated by surgical interference or atmospheric influences, is the efficient cause?

3. What evidence is there that inflammatory products of special nature are requisite to originate the disease, *i.e.* in how far does the surgeon by mere cutting or operations intensify ordinary inflammatory products into something specially liable to cause the formation of pus? In how far is the mere contact of air sufficient to provoke suppuration? How far are zymotic poisons influential to the obtaining conditions?

Firstly, that the disease is almost invariably secondary to inflammation of the bladder, may be considered, at any rate, definitely settled. I can do no better on this point than quote Dr. Wilks, who says in his 'Pathological Anatomy,' p. 358, "This is a secondary affection; it results from inflammation of the bladder." Rayer also, as early as 1839, seemed to have formed the same opinion. Rindfleisch describes the renal disease as an inflammation propagated from the greater urinary passages; while Dickinson writes, "Inflammation of the bladder, or of the

pelvis of the kidney, either as antecedent to the change (suppuration of the kidney) or associated with it, is so invariably present as to give a seeming warrant to the old view of extension by contiguity of inflammation. "It is not, however," he says, "a mere creeping of inflammation, but an absorption of morbid matter." On such authorities, then, this point may be regarded as settled. There can indeed be no question whatever that a very large proportion of cases are associated with an inflamed bladder; and of their being secondary in point of time, no one familiar with hospital cases will require proof. A patient is admitted with old cystitis and stricture; he is treated and does well for a time, and then has rigors, &c., and rather suddenly dies, minute suppurations in the kidney being found post-mortem, which cannot have been in existence long. Such a history is common, and by the repetition proves the position maintained. Of the foregoing cases, however, I find nine in which the bladder is stated to be healthy; of three of these, short notes have already been given. In addition to these nine, six other cases will be noted directly which also bear in the same direction, so that too exclusive a rule must not be laid down on this point. It is true that the affections classed as Bright's disease do not terminate in suppuration, but this hardly proves that the kidney is an organ which is not liable to idiopathic suppuration, a position that must be adopted if we decide in favour of the necessity of bladder disturbance for its production. The occurrence of cases of scrofulous suppuration about the kidney seems to me to settle this point,—that under certain conditions the kidney may suppurate independently of any external cause. Then as to Sir Benjamin Brodie's opinion, that the primary affection was in the kidney, and thence propagated to the bladder, we certainly do see a scrofulous state of the urinary passages starting in the kidney, and there seems some ground from some few of the cases in our records for assuming that in the case of circumscribed renal abscesses the inflammation may extend to the pelvis of the organ, and so to the ureter and bladder. Here again, however, we must agree with what has long ago been remarked by Rayer, that "it is rare that an inflammation primarily developed in the kidneys propagates itself to their excretory channels." The cases applicable to the illustration of this point may be found in a certain

proportion of the cases of suppurating kidney out of the whole number of those occurring in general pyæmia. The appearances here exactly resemble the disease produced in the case of a local origin; the same spots of suppuration are found in the cortex; the same linear arrangement on section of the organ radiating from the papillæ as centres, and in some cases the pelvis participates in the inflammation. Short notes are subjoined of cases which may possibly bear this interpretation, and in which the bladder also was affected.

Suppurative Nephritis following Typhoid Fever.

George C—, æt. 32, admitted under Dr. Barlow, October 5th, 1864, and died on October 10th. He had been an out-patient for a week or two with diarrhœa, and, becoming worse, was admitted. He had great oppression of respiration, which became worse until death.

The kidneys were very large, and full of small purulent deposits. The pelvis was inflamed. The mucous membrane of the bladder injected and ecchymosed. Urethra healthy.

Mitral Disease; Suppurating Kidneys without evident Obstruction to the Urinary Passage.

Mary W—, æt. 60, admitted under Dr. Wilks, December 19th, 1866. There is no mention of any urinary trouble in the history, and she died entirely from heart disease.

The kidneys weighed nine ounces; they contained many round patches of suppuration. The ureters and bladder were very moderately inflamed. No constriction. Embolic patches were found in the lungs and spleen.

Burn; Pyelitis; Suppurating Kidney.

John B—, æt. 14, was admitted under Mr. Forster, April 17th, 1868. Both lower extremities were severely burnt. The burns were superficial. He was severely collapsed. The surface suppurated healthily. A short time after admission blood appeared in the urine, and albumen remained constantly present till death. He had had stimulants ordered freely;

they were discontinued, and he improved. He never had any difficulty in micturition or pain over the bladder. The post-mortem, by Dr. Moxon, is to this effect:—The kidneys were large. The right pelvis was rough and vascular. Numerous lines of suppuration led up from it to the cortex, where were numerous spots of suppuration; the left kidney also had one or two suppurating spots, yet it presented more the aspect of a white Bright's kidney; the other also had somewhat the same appearance.

Bladder empty; submucous ecchymosis one eighth to one twelfth inch in diameter; right ureter very vascular at its junction with the bladder, less so higher up; left ureter less affected.

Renal Calculi; Suppurative Pyelitis.

Harriet V—, æt. 37, admitted November 18th, died November 19th, 1868. She was under the care of Dr. Rees. Since childhood had had pain in the left side, and for the last year had had attacks of dysuria, with pain, passing pus in the urine. She was admitted, almost pulseless, with an attack of seven weeks' duration, and she died the next day. The kidneys were four times their normal size. Each pelvis was much dilated and hollowed out into a large cavity. A calculus was found at the orifice of each ureter. The pelves, distended, contained opaque, yellowish muco-pus. Right ureter a little injected; left not so. The bladder finely injected, and at one spot ecchymosed, but other signs of inflammation were not observed.

*Acute Necrosis of Tibia; Pyæmic Suppuration in Spleen,
Testicle, Liver, Kidney, and Lungs.*

Henry S—, æt. 14; admitted August 11th, 1868, under the care of Mr. Hilton. He had his leg crushed between a door and door-posts, and his leg swelled. He was admitted on August 11th, and died August 25th.

Mr. Howse thus reports of the post-mortem:—The heart had slight aortic vegetations; pericardium ecchymotic; lungs contained pyæmic abscesses, and the liver exceedingly numerous centres of suppuration; bile healthy; spleen suppurating; kidneys both extensively suppurating; they presented just the

appearances (both in an equal degree) ascribed to surgical kidney. There was acute pyelitis with inflammation of the ureters, evidenced by vascularity, granular appearance, and cast epithelium. Tracing this down, it was found to extend to the bladder on the left side, though not on the right. For a radius of an inch round, the opening of the left ureter into the bladder was congested. Bladder healthy, except to the extent described. No stricture or other urinary obstruction. The whole of the vas deferens was distended by pus; the epididymis being in a state of acute suppuration.

Admitting, then, its somewhat rare occurrence, facts seem to show that in occasional instances a suppuration may start in the kidney and be communicated to the bladder.

With regard to the second point, the information required is exceedingly difficult to obtain. Not every case of cystitis complicated with stricture goes on to suppuration of the kidney, and consequently a comparatively small proportion of cases of *simple* cystitis, admitting that some do, will reach that stage. As an actual fact, all the cases that might throw some light upon the matter are spoilt for the purpose, owing to the absolute necessity for the introduction of catheters and sounds into the bladder for the purpose of diagnosis and treatment. The statement has been often made that all the patients who die of suppurating kidney have been subjected to catheterism or some such treatment. It is quite true that many are thus treated; but what is that worth as an evidence of the cause of the disease? The very fact of their having undergone this particular treatment is in itself often the best evidence of mischief about the organs, which, had opportunity been afforded, might have led to suppuration; the conditions most favorable for the production of cystitis are also those requiring the use of the catheter; and as far as I know, facts to prove the other state of things, viz. freedom from catheterism in cystitis, the kidneys generally remaining healthy, are not forthcoming. Some other cases have just now been detailed in which a suppurating kidney existed without catheterism, but they are hardly conclusive at the present moment, as they might possibly be due to some pyæmic state. The class that would help us most, and might indeed settle the question, would be that of paraplegia, if it could be shown that the proportion of suppurating kidney was

much higher when catheterism had been resorted to than without. But here, again, few paraplegias are able to dispense with a catheter, and if they can, they are so nearly in a healthy condition as regards urination that there is no reason why they should get a suppurating kidney. The details on these points in the 56 cases that are collected together here, are not sufficiently explicit to help in the matter. Of the 13 cases in which catheterism was employed all had cystitis, and ten of the thirteen had suppurating kidneys, the other 3 cases being healthy, but in the larger number of healthy cases, whether catheters were used or not, is not stated.

I have not made these remarks with a view of controverting the notion that catheterism and suppurating kidneys are closely associated. On the contrary, I am imbued with the general impression from one or two cases that I have seen, that it is a happy thing for a man if, should he get paraplegia from any cause, his bladder becomes contracted, as is sometimes the case, and his urine runs away as it forms; it is fortunate for him if he does not require the catheter. I believe that the question cannot be approached satisfactorily from this point at all, and that we must get at it by some other way than that of clinical observation. That other way seems to be none else than experimentation with urine charged with the secretions from an inflamed bladder. Dr. Ferrier has done this. In the 'British Med. Journal,' vol. i, 1873, p. 429, in an article on "Septicæmia and the Catheter," he describes an experiment in which urine containing phosphates and mucus, but which was not ammoniacal, was placed in a heated flask. For a whole year it remained clear till examined again, when its simple contact with a glass rod was sufficient to induce putrefaction. As far as it goes this appears conclusive, but it still leaves open whether the product taken for this one observation was a fair sample for other cases; whether also it was as near to having suppuration exciting qualities as it would ever have, if the bladder were left to itself; whether it was as virulent in its power as any product of a mere vesical catarrh could attain to.

Dr. Ferrier's experiment further only goes to show that *putrefactive decomposition* is not likely to occur in urine uncontaminated by air. But as I have said, it is not quite proved that the putrefactive state is necessary to produce a suppurating

kidney. It is true Dr. Dickinson thinks ammoniacal urine the great suppuration exciter, and ammonia, according to Dr. Ferrier, is only produced by putrefactive decomposition; but how far pathological states not caused by putrefaction are liable to excite suppuration is still left undetermined. Dr. Dickinson says on this point, "The simple presence of pus or mucus in the urine, though lasting for years, does not appear to set up the renal disorder so long as the urine retains its acidity and resists putrefaction." Now, some cases of abscess about the kidney and prostate will discharge pus by the ureter into the bladder without setting up inflammation in the latter during many months. But will an inflamed bladder go on discharging for long periods without setting up the renal disorder? I am unable to answer this question in the affirmative by any case followed to a conclusion on the post-mortem table, but it does appear that cases of vesical calculus, and even old cases of stricture, will go on for long periods with intermittent attacks of muco-purulent urine, *i.e.* of cystitis, and yet live on. But with this it must also be remembered that the proportion of kidney disease is high in these cases; the proportion of cases with one side more diseased than the other is large, and it is possible that suppuration may occur in one organ and subside again without the doctor knowing much or anything about it.

While, then, it is uncertain as to how far a simple cystitis might have the power of exciting suppuration in the kidney if things were allowed to take their course, it is *quite* certain that in the great majority of cases the renal affection goes with a fetid and ammoniacal state of urine, and is dependent upon it, because the arguments which may be advanced in favour of the production of suppurating kidney by a simple cystitis will apply with much greater force to putrid urine, since it will, of course, still hold true that, the greater the departure of that fluid from the normal standard, so will the chances of suppuration be increased.

3rdly. That inflammatory products of special nature are influential in originating the disease must be allowed if my previous conclusions be sound. In the first place, it was the primary object of this paper to show the effect of a special poison—erysipelas—upon the kidney and urinary tract. Again,

it has been admitted that in most cases of renal suppuration a putrefactive state of the urine is noted, and we can even go farther than this. The putrefaction of urine is efficiently explained by its retention in the bladder, and its contamination by air as evidenced by experiment. But urine is one of the most readily decomposable fluids, and yet many patients—old stricture cases, for example—go on under these conditions for a long time, and then die, a fair proportion of them, at any rate, with an acute disease, and not by one which, having existed long before, has at last terminated in suppuration. The mere contact of a catheter, then, soaked in the ordinary atmospheric impurities, would not appear to be sufficient, else how could such cases as those now to be quoted be explained, and, further, alkaline urine often exists in these cases without apparently provoking suppuration.

A man, æt. 33, was admitted on October 2nd, 1857, with perfect paralysis of his legs and bladder after a fall. The catheter was constantly used till February 13th, 1858, when he died of extensive suppurative nephritis. It cannot be supposed that this man's kidneys were suppurating four and a half months. It is certain that he must have gone for a long time without any such changes.

Or to take another case, a man, æt. 68, was admitted in 1865, who had been in the habit of passing a large catheter for himself. The dresser passed one for him once on his admission. He was seized with rigors not long after, and died. At the inspection his right kidney was suppurating. The ureters were congested, and he had an extremely hypertrophied bladder. He had also cancer of the prostate and liver.

Other cases are those of which Dr. Dickinson mentions the occurrence, and I have also found notes of similar ones where death has occurred from suppurating kidneys, the bladder being found healthy. All such cases as these seem to point rather strongly to some special blood poison communicated by means of the catheter to the urine or wall of the urinary tract, and one cannot avoid the suspicion, loath as I am to entertain it, that here is an example of a species of hospitalism; that if these patients had kept outside, if they had had a catheter passed at their own homes, they would probably not have died of surgical kidney. It would be very interesting, if it could

be obtained, to get a record on this point of a large number of deaths in old stricture cases in private practice. They would, I suspect, give a much smaller proportion of suppurative nephritis compared with the less intense forms of inflammation.¹

The potency of operations in provoking suppuration might, I think, be deduced from the stone cases I have given; but here, again, are difficulties in the way of taking an estimate of any single cause when more than one abnormal condition exists. Operations for stone, except lithotrity, lay open the bladder to the external air, and thus may be said to favour, if not directly to cause, suppuration by urinary decomposition. Lithotrity was performed in eight cases, and in one only was the kidney found healthy. Of twenty-two cases of lithotomy the kidney was healthy in only one, and in two cases of perineal section both had diseased organs; but then in eight of ten of the patients not operated upon, the organs were also diseased, so that it is doubtful if the calculous affection, as it existed before any interference, was not already sufficient.

On the other hand, however, cases in which the bladder is simply laid open are represented by the group of carcinoma of the os uteri and bladder. Ten such are given, and in only three of them was the kidney suppurating, so that, allowing that in a larger number of cases the proportions might be altered, it appears in two thirds of these cases the mere contact of air with the urine had failed to excite a suppurative nephritis.

A case of ectopia vesicæ which seems of value on this head may be very shortly alluded to here. The child was fourteen months old, and therefore for that period had been accustomed to the dribbling away of its urine. It was operated upon by Mr. Durham, with a view to closing the bladder, by making an anterior wall from the abdominal skin above it. We may not unfairly assume, I think, that the surface representing the bladder must have been subjected in the manipulation of paring edges, &c., to many chances of inflammation, and at the post-mortem, in addition to the dilatation of the ureters and pelves, which would seem to be a common condition in such

¹ For an interesting case in connection with this point, and, so far as one case goes, direct evidence of the possibility of the occurrence of pyæmia and suppurating kidney without any contamination from external sources, the reader is referred to a note at the end of this article.

cases, from the puckering, I suppose, which is produced by the malformation about the vesical orifices of the ureters, the child had congested lines running through the cortex of the left kidney, exactly as in early stages of surgical nephritis.

To summarise our conclusions as we have done the headings of these remarks, I think the facts I have given and those by other persons before quoted bear me out in saying—

1. That the suppurative nephritis is generally secondary to disease about the bladder and to decomposition of urine.

2. That it may be produced without putrefaction of the urine, without any apparent disturbance from without, by the occurrence of retention, either in the bladder or pelvis of the kidney.

3. That the free communication between the bladder and external air has not a large share in most cases in producing suppuration of the kidneys, but this is not so at special seasons or when this condition is coupled with inflammation of the bladder, whether set up by decomposing urine or other causes.

4. That atmospheric conditions or particles, at particular times, more especially those having to do with erysipelas, are likely to induce the disease.

5. That surgical operations, in proportion to the intensity of the inflammation they excite, and the completeness with which they ensure that those inflammatory products shall be intensified by the admixture of air, are also fertile sources of disease.

I have been, I fear, somewhat prolix in thus breaking up the ground of possible causes of suppuration of the kidney without decomposition of urine, because so doing bears directly upon one of the great questions of the day as to the first cause of all suppuration.

Bacteria are in fashion just now, and no more ready explanation could be given, if they are essential to suppuration, than that they are the cause here, for what fluid is more apt than urine to generate these organisms at the earliest periods of decomposition. I wanted, if possible, then, to exclude certain cases from the category of suppuration having a bacterial origin, because, as I think, another explanation of their occurrence is more applicable, while in the cases that are assumed to be due to erysipelas poison those who believe in the bacterial origin of diseases of this kind, rather than the origin of bacteria as a mere result of changes common in certain tissues and fluids under any state of

decomposition, will probably not find it hard to say that the result is only as might have been expected—a disease commencing with bacteria has produced suppuration.

The question of the minute anatomy of this disease is also bound up with this question of bacteria. The latest description of its histology is, so far as I am aware, that of Dr. Dickinson, in the paper quoted before, in the ‘*Medico-Chirurgical Transactions*’ for 1873. The changes he there describes are, dilatation of the straight tubes, distension and clotting in associated blood-vessels, and disseminated interlobular suppuration, the distribution of which is regulated by the course of the veins. He further states that the disorder has its origin in the regurgitation of urine charged with morbid products; this, by transudation or some similar process, enters the neighbouring blood-vessels, and charges them with an infection resembling in its results that of pyæmia. This is distributed by the veins to the rest of the gland, sowing abscesses in their course, and ultimately causing constitutional symptoms analogous to those of pyæmia otherwise derived.

The abscesses are thus ascribed to embolism, as far as I understand the description, though I fail quite to see the *rationale* of the process. It may, I think, be objected that if clotting goes on in the veins, and the disease is disseminated by the dislodgment of these, rather, ought it to produce or tend towards a *general* pyæmia than to a local distribution of abscesses. How, indeed, unless some back current prevail—a hypothesis which would ascribe to a rare condition a common disease—can plugging in the pyramids infect the whole organ? The arteries may possibly participate in any disease which attacks the veins or parts around, but one would not willingly appeal to their aid, knowing how apt they are to remain untouched in inflammatory diseases in their neighbourhood. At the same time the theory of embolism is so simple, and explains so thoroughly isolated suppurations, that once it is entertained there is no limit to its capacity. Moreover, we must now give some attention to the question of bacteria, and must reconsider the arguments based upon the *probable* course of results, by the further known fact that these bodies, in addition to being *carried* by the stream, possess very active movements of their own, and thus may bring about conditions for which we should not otherwise be prepared.

But there is another side to the question, viz. the tendency of organs to modify the outward form of disease according to their composition and the relations their several parts bear to each other; for instance, why does the lung so frequently mould its diseases in the tubercular form?—why do certain rashes on the skin take each their peculiar traits? It is, perhaps, vague to say such is their nature, but I take this to be the fact, and so with the kidney—when it suppurates it does so in this disseminated form, not necessarily because it has emboli lodged it; and so, whether it be in a general pyæmia or in a local disease, the same characteristics are to be observed; further, the kidney has a tendency to suppurate in a special disease, viz. in acute necrosis of bones. This fact has been sufficiently dwelt upon by Dr. Moxon to make it needless to say more on the point, but its doing so is an additional point in favour of the view I urge, that the organ has peculiar tendencies, which are not to be judged of by other diseases alone, but from its own stand-point also.

Rindfleisch describes the disease as an interstitial nephritis, and, on the whole, I am disposed to agree with this view, leaving open the question of the carriage of the poison. The small points of suppuration unquestionably occur in the course of vessels, but, inasmuch as arteries, veins, and lymphatics, all run in the same connective tissue, it may seem at least doubtful whether all of them are not at different times or in different localities engaged in disseminating the diseased condition.

The changes, then, upon which I would lay stress are—1. A dilated and blocked condition of some of the straight tubes, while the tributaries to these may also show the same overgrowth of the epithelium, be collapsed and shrunken, and sometimes cystic. 2. A general nuclear growth in the cellular tissue around the vessels belonging to these parts, and a specially excessive growth of nuclei in the parts which are forming abscesses. I have not found clotting in the veins always present, though it is so frequently; but it is at least as likely that it occurs as a consequence of the disease outside them, as that it is a primary condition resulting in abscess. How to decide on the point it is difficult to see.

I look upon the disease, then, as a cellulitis of the kidney, and in so describing it, I wish to be understood to mean, not a

mere disease confined to the gland, but one attacking, let us say, the urinary cellular tissue as a whole, viz. that large mass which surrounds the organ, and which, looked upon as mere fat, is stripped from the organ as of no moment in its diseases, but which, nevertheless, is exceedingly commonly very dense and thick in old cases of urinary obstruction; the submucous cellular tissue of the ureter, and the submucous tissue of the bladder: the fact that suppuration of the kidney occurs more frequently in cases of operation about the bladder I look upon as evidence of this, because the said tissue is more directly involved, not because greater facilities are given for the decomposition of the urine, since that condition would certainly be counteracted by the surgical relief afforded by the free evacuation of the contents of the bladder.

Another important point in its pathology must also be specially insisted upon as explaining some clinical features, viz. that the distribution of the disease in the organ is a local one, *i. e.* each suppurating centre spoils a certain part, but yet leaves much of the cortical structure untouched. The inflammatory processes occur, first among the straight tubes, and the diseased parts are stopped off from the general stream of urine, and, therefore, by no means necessarily give evidence of their existence in the urine.

So much for suppuration of the kidney; but other conditions are met with, sometimes in connection with it, more often, as facts show, unconnected with it at all, but still the result of chronic obstruction. What are these conditions? They are in the prostate, sacculation and abscess; in the bladder moderate over-distension, hypertrophy and thickening of its muscular wall, muscular spasm producing contraction and sacculation of its cavity, paralysis producing dilatation. Given, then, a case of stricture of the urethra, or any obstruction about the bladder to micturition, will all these changes enumerated in all probability occur. If not, why not? This may not at first sight appear to be a question of much interest. All the same, the future of such a case depends upon the answer, and this, though apparently so simple, involves the consideration of very complex relations between the bladder and kidney. Let it be considered, for instance, why one patient has sacculation of the bladder, another dilatation, a third such contraction of its cavity that it

will hardly contain an ounce of urine. Why is this so thickened that in place of a line or two the wall measures an inch? Why is that, apparently with an equal amount of obstruction, not thicker than the healthy viscus? And then, having attempted to form some conclusion in any case upon the state of the bladder, what influence will the condition which we assume to be existing, have upon the kidney? Here is a case with a good kidney on one side, a much diseased one on the other; there suppuration in one associated with a wasted or, may be, quite a healthy state on the other; and I may remark that all these questions are based on facts and differences of common occurrence in the disease now under consideration. It is easy, upon a moment's reflection, to see how such conditions *may* arise; it is also not difficult to see how important such variations must be in any particular case, and yet how difficult it is to form an opinion. To take, for instance, one very interesting point in connection with the subject, why is it that *atrophy* is so constantly associated with obstruction? It may be said that the mere occurrence of permanent pressure is sufficient to induce an atrophy of the gland. This is very marked in some of the records of cancer of the bladder and uterus, in which, the growth having involved one ureter more than the other, atrophy has gone on on the affected side almost to destruction of the kidney, which, while retaining much of its external form, showed none of its proper structure, and in one case weighed only half an ounce. It is by no means clear why this should be so. As has been said before, we know nothing of the force which is represented by the excretion or secretion of fluid, what amount of weight expressed in pounds a given kidney is capable of raising by its products, what amount of tension force or pressure is capable of neutralizing the function of secretion. It will, I suppose, vary in each individual, and in the individual it will not be the same at all times, fluctuating as the constitutional tone and as the local blood-supply and stimulation, and according as the pressure or secretion force predominates so shall we get the morbid anatomy expression of it in the form of atrophy or cystic disease. Of course I do not here refer to any cystic condition which may possibly be due to any new growth—only to such as are called retention cysts, or which have that nature. In the former—atrophy—the scarred and shrunken parts that are found in

the kidney are no more than the evidence of balanced power, of rest and functionless inactivity ; the latter—the presence of a cyst—shows the insufficiency of the pressure to neutralize the function of the organ.

From the cases here collected together it would seem that the most favorable condition for ensuring a complete atrophy of the kidney, or, indeed, the only state under which such a balance of power is procured, is the implication of only one organ. If complete wasting of one kidney is to be attained, it can only be by the other being capable of taking on the work. Supposing that one kidney becomes blocked by a calculus, or one ureter is obliterated by a growth in the bladder, if the other kidney be healthy the blocked organ will soon begin to show signs of shrivelling, and may dwindle down to a mere relic. If, on the other hand, the remaining kidney is not a capable organ, the blocked kidney will, I think, probably become cystic, and here lies the difficulty, and, perhaps, impossibility, of being able to decide the question propounded. So long as there are products to be excreted, so long, almost, does it appear that the kidney will do the work demanded of it, and thus hardly is there a limit to the secretion force when attempting to measure it by the pressure which will destroy it. The kidney may be truly demoralised, to enforce laziness is to ensure a wreck, and, just as with the mental faculties, the destruction brought about thereby is very complete. I have not thought it necessary to detail any cases illustrative of these remarks ; they are common enough in our inspection records, and we are all familiar with the wasted kidney the result of pressure. Perhaps all are not so familiar with the one-sidedness of the condition, and even if a moment's thought be sufficient to show that, if observed at all, it must be unilateral, as we are not capable of going kidneyless, it is yet not at once apparent that such an extreme condition is dependent on one organ being left intact quite independently of the needs of the economy, merely as it is the only way of ensuring rest to the other organ.

Dare I venture to suggest that these very unpractical remarks have just a suspicion, if no more, of a bearing upon treatment. The operation of nephrotomy is advocated in the surgery of to-day. Such a proceeding may now and then be required in cases of renal calculus where the kidney structure is not

destroyed. The very attempt at it implies that an opinion has been formed in favour of the soundness of the other kidney. If these facts show that pressure on the ureter causes atrophy of the corresponding organ, it is just possible that pressure, by ligature of the ureter, would bring about a subsidence of calculous symptoms with the shrinking of the gland, and this, we cannot but think, at much less risk to the patient than by the excision of the whole organ. As to the feasibility of such an operation, those skilled in the surgery of this region must determine; but one may make the remark that, if surgeons are bold enough to excise the kidney, they will not mind attempting, at any rate, even though it be difficult, to *pick up* the ureter.

That in a large number of cases one kidney is much worse than the other is a point of special importance in relation to diagnosis and prognosis. The occasional occurrence of suppuration on one side only has been noted by others, but I wish to refer, not only to suppuration, but to a wasted condition also; and, taking these two states together, to insist upon, not the occasional, but the very frequent, difference in the extent of disease to be found in the two glands. Further than this, it is especially noticeable in certain groups of cases, as in stricture of the urethra and in cancer of the bladder. It is markedly absent in others, as in paralysis and cases of large prostate. Those in which it is absent have either acute disease or over-distension of the bladder, in which dilatation is present or hypertrophy of the muscle absent, while inequality of the disease on the two sides is found especially in those cases where great hypertrophy of muscle, and often a contracted state of the bladder, are leading conditions. It will be remembered that the normal anatomy of the ureters and base of the bladder is precisely such as would render it likely that in abnormal states of muscular action and thickening there might be an impediment to the outflow of urine from the ureters, and an unequal impediment on the two sides is by no means improbable. The ureters pass through the thickness of the coats of the bladder in a very oblique manner; they are, to quote Pettigrew, "covered externally and internally by the longitudinal, slightly oblique, and very oblique fibres of the bladder, from all of which they receive accessions. The very

oblique fibres, which are much the strongest, run nearly at right angles to the longitudinal fibres of the ureters."

Thus, there is a tendency during a contraction of the fibres to obliterate the ureters, and that this would be much increased in any hypertrophied bladder-wall is nearly certain. In addition to the obliquity of the vesical ends of the ureters and the plaiting round them of the muscular fibres, an additional security against regurgitation of urine is afforded in the healthy state by the exceeding thinness of the walls of the ureter as they open in the bladder, so that even in cases of mere prolonged distension this valve-like arrangement must be compressed by the urine contained in the bladder, and some amount of temporary obstruction result.

In cases, then, of paralysis of the bladder from disease of the spinal cord, where the conditions are recent, it might be expected that, if the kidneys suffered, they would be likely to do so to an equal extent, and that in all old cases of urinary obstruction, putting aside those cases in which there is an obvious implication by disease of one ureter more than another, according as the bladder is in a dilated condition or a contracted one, so will the two kidneys be alike in the extent of their disease or different, especially if we bear in mind the very frequent association of thickened muscle with puckerings and sacculations.

Difficult, if not impossible, as the existing condition will be to predict during life, it will yet be a question of much importance in individual cases as obscuring the diagnosis of the patient's state. If, with previous cystitis, the bladder be contracted, or if there be any decided history of what is called an irritable bladder for any length of time, at any period of the case, then there will be a probability that the kidneys are not in a similar state as regards disease. But if we are unable to obtain particulars, either by history or examination, as may very possibly be the case, the diagnosis of the exact condition will be one of the greatest difficulty.

During the past year or two, surgical kidneys have received a somewhat large share of professional attention, and positive statements have been made that it is possible, by the aid of the microscope and quantitative analysis of the urine, to settle the state of a patient's kidneys when he is suffering from old stricture, &c. I thought then, and am more decidedly of the

same way of thinking now, that such an opinion was in many cases anything but correct, and that the tests proposed to be applied in such instances would not stand against a wider experience. I should say this with some diffidence if only speaking on the chemical side of the issue, for though I had hoped to have carried out an extended series of observations on this point, the duties attaching to the office of Surgical Registrar at Guy's have been too intrusive to allow of the intention being carried into effect. Still, in the few instances which have been investigated it has seemed very doubtful if the excretion of urea was at all decreased. Thus—

CASE 1.—A man suffering from very old stricture had had perineal section performed, and was in the tremulous, cold, drowsy condition generally ascribed to uræmic poisoning. The urine was collected as well as it could be under the difficult circumstances of the case, but it is probable that not much more than half the urine actually excreted was obtained. The actual quantity measured was fourteen ounces. It was alkaline, sp. gr. 1017, and contained 199·38 grains of urea. Taking this at so much per ounce, which is obviously the only fair way of estimating the quantity excreted in this case, we get 14·21 grains per ounce, a result which is up to the required standard. This man subsequently died, and his kidneys, though not on the whole bad, still showed on one side a large patch of wasted cortex equal to about a third of the side surface.

CASE 2.—A boy was admitted with acute necrosis of his tibia and severe pyæmia. He had pericarditis, and as it was probable that the organs attacked would be in a similar state in his case as in others of the kind, and that the kidney would be suppurating, all that I could get of his urine—only three ounces, for he was insensible and very restless at the time—was carefully examined. It was alkaline, turbid, dark straw colour, sp. gr. 1015, without albumen, and contained 13·14 grains of urea per ounce. He died next day, and the kidneys were studded with minute points of suppuration, the heart and the lungs also containing abscesses.

CASE 3.—Mentioned in the early part of this paper as having curious pyæmic symptoms, with calculus in the bladder. Was

passing urine of sp. gr. 1007, alkaline, ammoniacal, without albumen, in quantity three pints in the twenty-four hours. It contained 591·59 grains of urea.

CASE 4.—Referred to previously as Isaac L.— Was passing six days before death 433 grains of urea, the urine being acid. Five days before, the urine being neutral, he passed 482 grains, the relative amount of solid to fluid being the same as before, but the quantity excreted being rather more, and the twelve hours before death he passed thirty ounces of urine, both alkaline and ammoniacal, sp. gr. 1020, a quarter of it pus, but with 328 grains of urica in it.

CASE 5.—A patient, admitted with an enlarged prostate, had puncture per rectum performed. His urine was pale straw, alkaline, containing phosphates and pus, sp. gr. 1012. He passed only thirty ounces in the twenty-four hours. The albumen was small in amount; the thirty ounces contained 295 grains, or 9·83 per ounce. This then was rather diminished, and while others died passing a usual amount, he went out well, although the damage to the kidney was presumably greater in his case than in the others.

We can see at once, from the pathologist's point of view, why this is. The disease in question will not uncommonly leave one kidney entirely untouched; it will generally leave a good part of both quite capable of work, and this even in the most severe forms of the disease—in suppuration of both kidneys. We examine the kidneys by the microscope, and in many cases the greater part of the cortical substance remains intact; it is not so in Bright's disease, which is an affection of the whole organ. Moreover, I think it is not unfair to argue that, just as the depriving a patient of one kidney will nearly certainly lead to the other doing double work, so in a local disease like this the parts not affected in both organs will do duty for those that are.

Then, again, as to the microscopical examination of the urine, I have found casts in the urine certainly, but if any one thinks these are to be found in all cases he is very much mistaken. What is the condition of the urine? Very generally consisting in great part of viscid, slimy, decomposing pus, and

the search becomes as difficult as that in the old adage of the needle in the haystack.

But the chemical or microscopical part is not, as I hope, by any means all the question. The clinical histories of uræmia and suppurative nephritis are not the same. If the urea is considerably diminished, ought not evidence to be given of it by uræmic symptoms, prominent among which is to be noted *reduction*, not increase, of temperature? On this point I suppose most are now agreed, that uræmia, while it produces the stupid condition of mind, the dry glazed tongue, the muscular tremor of fever, yet is not accompanied by heat of surface. It is needless to recount authorities for this—enough that it is a fact. Now, these cases of suppurating kidney mostly have a high temperature. They are being treated for stricture in the hospital, when suddenly shivering occurs and increase of surface heat. Would this happen under uræmic states? Death comes, it is true, not unfrequently by a comatose state, but this may very possibly be due to blood poisoning of a septic nature, and perhaps, as has been suggested, may have nothing to do with the kidney, but rather depend upon absorption of decomposing matter from the surface of an inflamed and ulcerating bladder.

Then, again, supposing that in chronic cases death is caused by gradual extinction of the kidney structure, it would not be unfair to assume that, in a fair proportion of cases, a hypertrophied condition of the heart would be found, as in other cases of chronic disease of the kidney. I cannot find that this is so. In only two or three of a large number of the cases in our records, which I examined with special reference to this point, was the organ notably enlarged; it ranged frequently to eleven or twelve ounces, which is rather above the average, but no more. The reason of the absence of uræmic symptoms is, from an explanation already given, very obvious. Then, in relation to the question of the possibility of spontaneous cure of suppurating kidney, the difference often found on the two sides is of the highest importance. Looking at the disease even in the acute form, as one merely attacking small patches of the organ, it is possible, one may suppose, that such a condition may subside and the patient get well. Dr. Wilks and Dr. Moxon both recognise pathological conditions which they ascribe to old cured suppurations about the kidney, and I myself remember a patient

under Mr. Hilton's care some years ago who after amputation of the arm had pyæmia and passed a considerable quantity of blood in his urine. He, however, just escaped with his life, and we had no opportunity of examining his kidneys. He might, of course, have had merely an acute nephritis, but it is more probable that he had the condition known as suppurative nephritis.

The *treatment* of suppurative disease of the kidney is more simple, it would appear, than in many other maladies, since the question of cure by medical aid does not enter into our calculations. It resolves itself simply into the question of how to prevent it. Supposing a patient to have surgical kidneys, he may get well, and the more readily, perhaps, as has been said, if only one and not both organs be affected, but by no means in our power can anything be done towards directly curing the disease. Prevention, on the other hand, would seem to be perfectly possible, and lies within our province, and we most persistently neglect its attainment. Granting or not the general applicability of Dr. Ferrier's conclusion, that the urine is not prone to undergo putrefactive changes, "so long as there is no direct source of impregnation from putrefactive germs from without," no surgeon refuses to acknowledge the association of the disease with catheterism. There is no one but must admit that the urine, when exposed to the air, is a readily decomposable fluid, and that the exposure of large cavities or surfaces abnormally to external influences forms *the* great anxiety of surgery, so likely is it to be followed by suppuration and septic or suppurative fever. Recognising this well in other parts of the body, large chronic abscesses, &c., are left alone as long as possible, and in cases of necessity free incisions are made in place of limited ones, so that no retention of decomposing fluids may occur.

In the case of the bladder, however, all the ordinary rules of surgery are departed from, and its cavity is exposed without proper precautions to external influence. One man will have a catheter retained, another may have a canula passed in through the rectum. By neither of these, to say nothing of the various major operations for stone or stricture, can the urine be constantly flowing, and probably by neither is there complete exclusion of air from the bladder, or, which comes to the same thing, from a practically stagnant column of urine in communica-

tion with its mucous surface. Decomposition very readily ensues, and with what result all are but too familiar. How very different is the usual method of procedure for paracentesis thoracis. In that case every precaution is taken, yet, as far as I can see, the one part is not more important than the other. The conditions existing in either case are not altogether parallel, because the bladder, being a muscular viscus, contracts as it empties, and so is probably, unless full of urine, at no time in any sense a cavity, as the pleural sac must be. But then the size of the sac matters nothing; the smallest area of mucous membrane subject to contamination from without is surely capable of starting a putrefactive process which will be communicated to the entire organ.

The difference in the methods of treatment carried out in the two diseases lies, we must suppose, in a spirit which is perhaps akin to the contempt said to be engendered by familiarity. The one class of cases is so common; catheters are passed over and over again, and do no harm, therefore, some special conditions are necessary to produce suppuration in the kidney, and it would neither be wise nor convenient to submit every case to the trouble of what, in a large number of instances, would be needless precautions. Much truth lies, no doubt, in this argument, and *perhaps*, in dealing with isolated patients, the said precautions would not be necessary; but where a large number of persons are aggregated together, as in a hospital, inasmuch as we do not know certainly what the peculiar conditions are, which are necessary to the production of the disease, it would, I believe, be only right and proper that some further measures should be taken than are in general adopted now. Besides, though only a few of the great number of stricture cases get suppurative nephritis, many more have cystitis and febrile symptoms. If only these could be avoided a great gain would have been accomplished, since often does one see the successful treatment of stricture delayed by pyrexia, and of all the troublesome cases to cure what more tedious than one of chronic cystitis? But, looking away from stricture and such troubles to diseases and injuries which issue in paraplegia, we find that half of all the cases that die have suppurative nephritis. They do, indeed, die directly from that state. Could this heavy cause of mortality but be averted, and half the number of cases would be

saved, or have life prolonged, let us hope, to use their brains for the benefit of their fellows.

The preventive treatment may be carried out under two different conditions, that is to say, by anticipating the chance of decomposition of the urine, or by destroying the putrefactive property when it has arisen, and curing the cystitis which such a state has caused.

To ensure the first, it has been proposed to use carbolized oil in place of the common oil when lubricating catheters previous to their passage, and to this I have only to add that in all cases where it is necessary or advisable to retain an instrument in the bladder, in case of paraplegia, enlarged prostate, &c., it would surely be not too much to ask that the same method should be adopted as is used in paracentesis thoracis, viz. that an india-rubber tube should be attached to the catheter as soon as the latter has been passed, and the urine then be allowed to drain away under water, the free end of the tube being immersed in some disinfectant fluid by the bedside.

In the other class of cases, where the bladder is already inflamed and the urine decomposing, we have to aim at the complete evacuation of the urine and an adequate disinfection of the bladder. To accomplish these ends is not easy. The disinfectants in vogue at present, or rather as at present used, are utterly incompetent, I believe, for the purpose, from the fact that they can only be used in diluted solutions, and are only temporary in the benefit they impart. To make their application of permanent service some means must be devised for their constant contact with the diseased surface, though it is difficult to see how this can be effected. There can be little doubt that, could it be performed without setting up inflammation, the best thing in many cases would be to lay open the bladder by the median or lateral lithotomy incision, taking care by this means that the urine should run away as it formed.

This cannot be done, however, because, as I think statistics show, operations about the bladder considerably enhance the probability of the occurrence of suppurating kidney. Thus, though we may see that where the bladder is closely contracted, or thoroughly drained by a fistulous opening, disease of the kidney is less liable to occur, we are unable to take advantage of this plan of treatment. Failing this, it is indeed difficult to

know what to do. In some cases it might, perhaps, be possible to arrange a constant flow of a disinfectant solution into and out of the bladder, but this, again, would be troublesome, and in many cases impossible, from the requirement of the passage of a catheter of the largest bore.

To face a difficulty is to find an escape from it. It probably will be so in this instance. What is wanted for these cases is a disinfectant which, not caustic enough to harm the bladder, shall yet be all powerful in completely arresting decomposition. In the antiseptics, as now applied to the vesical mucous membrane, we have no such remedy, and, I venture to say to the surgeon with all deference, we are at present incompetent to deal with much of the disease occurring in the bladder. But with such a wide field of observation—for decomposition of the urine is a common occurrence—such a state cannot long continue. Surely, by trying the various drugs, some one or more can be discovered which will fulfil the required conditions, while the practical results which may be expected to follow will well repay the investigator. The inquiry is one of no mere local importance—I mean local in respect of its relation to one set of organs—though in this light only its value cannot be over-estimated; but it should add to our knowledge, where we are now most ignorant, some observations on the action of disinfectants.

Germs and bacteria are nowadays said to be potent in their evil influence. What will kill them or stop their action? The surgeon with his cases of cystitis is dealing with a fluid which abounds in these bodies, and in demonstrating what is a disinfectant to putrid urine he may show what is or is not destructive to the life of these low organisms.

NOTE.—Since the completion of the foregoing article it has occurred to me to have to make the inspection of a case of old stricture with suppurating kidney and pyæmic pneumonia, where it was hardly possible that the patient could have come by his death through the instrumentality of the catheter.

I am glad to be able, with the kind permission of Mr. Davies-Colley, under whose care the case was admitted, to make use of the notes of it in this addendum.

It will be seen that, with a single exception, and that three years before his death, the man had, till his entrance into the hospital, never had a catheter passed. Admitted on January 19th, he died on the 22nd, a period so short as to be insufficient, I think, for the development of the conditions found post mortem. His urine was never ammoniacal, though pungently offensive at the time of death.

Frederick L—, æt. 48. When a boy he had nocturnal incontinence. At the age

of twenty he had gonorrhœa twice, and has never passed a full stream of urine since. He enjoyed good health till six years ago, when he had pains in either groin and much sweating. Four years ago he passed blood with his urine twice or three times. Three years ago, having difficulty in making water, his medical man passed a catheter along the urethra, and, finding it arrested about three inches down, he desisted, his object having been attained in ascertaining the presence of a stricture. No force was used, and no bleeding followed. Since then he has had no instrument passed, and a month ago a swelling came in the perinæum; it got better under medical treatment, but returned again a week ago. He then had retention, which was not relieved by general treatment, and he was, therefore, sent at once to the hospital.

On admission he had a perineal abscess, which was opened in the median line, the urethra being subsequently incised. A No. 8 elastic catheter was passed into the bladder and tied in. The urine drawn off was very much the colour of weak milk tea, but was quite inoffensive. He was in a low condition. He died on the 22nd.

Before death seven ounces of urine were collected, and presented the following characters:—Sp. gr. 1010; straw colour, turbid, containing a good deal ofropy pus; offensive, alkaline, but not ammoniacal. Bacteria present, but not in great quantity. Pus-cells had a tendency to arrange in very wide tubular moulds. The seven ounces contained as nearly as possible 60 grains of urea.

Autopsy.—The lower lobe of the left lung had an ash-coloured slough, an inch in diameter, on its surface, communicating with a large pyæmic abscess, of gangrenous nature beneath, the centre of which was now sloughing out as a necrosed mass. Lungs elsewhere healthy. Heart 11 oz. Kidneys 11 oz. Capsules thick. Right, small and very puckered on the surface, and with its pelvis much dilated. Pyramids obliterated. The whole organ pale and fatty, but not suppurating. Left kidney suppurating in many minute points all over, much larger than the other, and pelvis less dilated. It also had irregular puckerings from old wasting. Pelvis on both sides full of milky urine, but not injected. Ureters both distended to the size of the little finger.

Bladder irregularly dilated. A large pouch protruded on the left side, overhanging the left ureter. Muscular coat very thick and trabeculated.

Mucous membrane a little injected.

The membranous urethra was much diseased, being ulcerated, and communicating with burrowing abscesses in the perinæum and about the pubes. Three separate strictures of the passage existed—one, just anterior to the bulb; a second, $2\frac{1}{2}$ inches along the canal, very cartilaginous; the third, a very narrow band at the base of the glans.